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March 15, 2023

Docket Control
ARIZONA CORPORATION COMMISSION
1200 West Washington Street
Phoenix, AZ 85007

RE: Arizona Public Service Company (APS or Company)
2022 Transportation Electrification (TE) Mid-Year Progress Report
Docket No. E-00000A-21-0104

Decision No. 78383 (Dec. 28, 2021) provides that "[APS] shall file semi-annual [TE] progress reports with the Commission detailing the status and implementation of the [TE] plan, by March 15 and September 15 of each year." Accordingly, APS submits its 2022 TE Annual Progress Report in compliance with the above-referenced decision.

Please let me know if you have questions.

Sincerely,

/s/ Rachael Leonard

Rachael Leonard

RL/me
Attachment

cc: Elijah Abinah
Barbara Keene
Cameron Nance
Ranelle Paladino

ACC - Docket Control - Received 3/15/2023 9:40 AM
ACC - Docket Control - Docketed 3/15/2023 10:21 AM

ARIZONA PUBLIC SERVICE COMPANY

2022 TRANSPORTATION ELECTRIFICATION ANNUAL PROGRESS REPORT

March 15, 2023

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I. Introduction

Arizona Public Service Company (APS or Company) is filing its 2022 Transportation Electrification (TE) Annual Progress Report in accordance with Arizona Corporation Commission (ACC or Commission) Decision No. 77289 (July 19, 2019) and Decision No. 78383 (December 28, 2021). This report includes information on all active APS TE initiatives during the January 1 – December 31, 2022, reporting period.

II. TE Market Update

In 2022, the light-duty electric vehicle (EV) market performed well despite manufacturing challenges and supply chain constraints. As more customers adopt this new technology, APS will continue to identify ways to increase the Company's understanding of load impacts associated with EVs. APS will do this while also increasing customers' awareness of the technology and APS programs that are designed to improve the integration of more EVs on the grid in a reliable and affordable manner for all customers.

According to the Electric Power Research Institute (EPRI), there will be approximately 140 new plug-in Electric Vehicle (EV) models available by 2024.[1] As of December 31, 2022, the estimated number of vehicles in operation for Arizona and in APS's service territory is 82,762 and 37,855, respectively (EPRI, 2022). Both totals represent a nearly 43% increase in vehicle registrations over the same period from the prior calendar year (December 2021). The growth of EV adoption in Arizona is on pace with the national average. Guidehouse's (GH) Strong Market Transformation (SMT) scenario forecast is for just over 260,000 EVs in APS's service territory in 2030.[2] According to PlugShare, there are 3,976 charging ports in Arizona, with APS's service territory containing nearly 18% of Level 2 and 31% of Direct Current Fast Charging (DCFC) ports.[3]

The following figures summarize the TE Market Update, including current EV adoption in APS's service territory and Arizona, and the EV forecast for APS's service territory (Figures 1 – 3).

1 EPRI, December 2022. Retrieved from EPRI Program 18 – Electric Transportation.
2 Forecast based on the Guidehouse (GH) Strong Market Transformation (SMT) Scenario developed for APS in 2019. Guidehouse also developed three additional forecasts referred to as Business as Usual (BAU) Low, Medium, and High (See Figure 3). In late 2022, APS engaged Guidehouse to update the EV forecast with final results expected in April 2023.
3 PlugShare, December 2022. Retrieved from https://www.plugshare.com/. There are different kinds of chargers categorized by Level 1 (L1), Level 2 (L2), and Direct Current Fast Charging (DCFC) and each charge EVs at different speeds. L1 chargers utilize a standard household, 120-volt outlet. L2 chargers utilize a 220-volt outlet or power source. DCFC chargers utilize 400-volt, three-phase power.

Figure 1: Estimated Vehicles in Operation – APS and Arizona

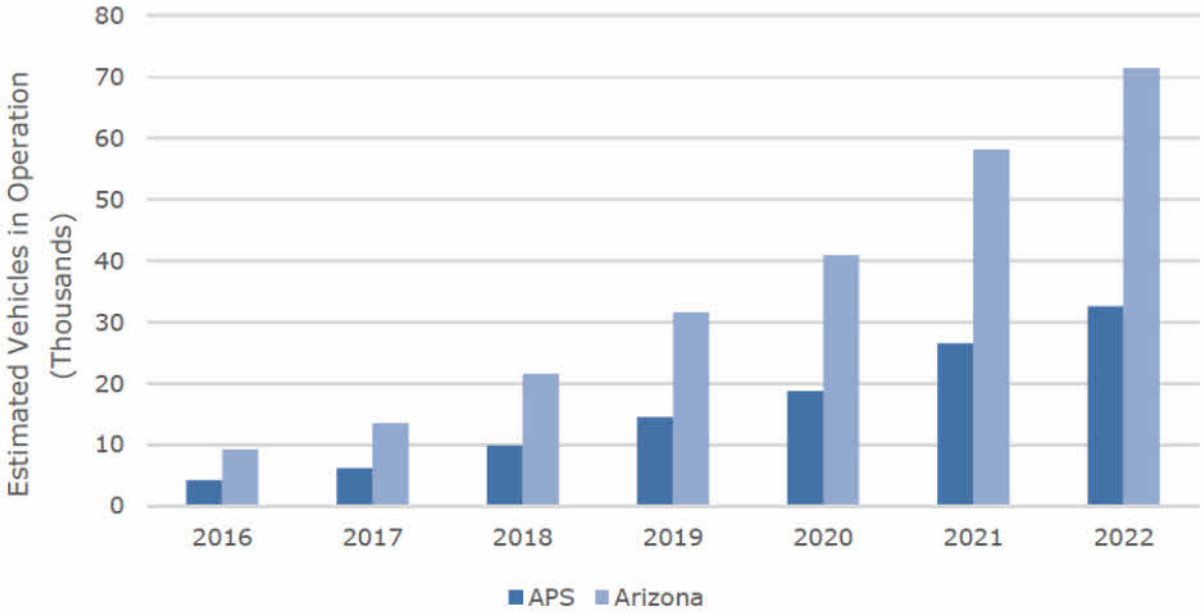


Figure 2: APS Territory Light-Duty EV Forecast

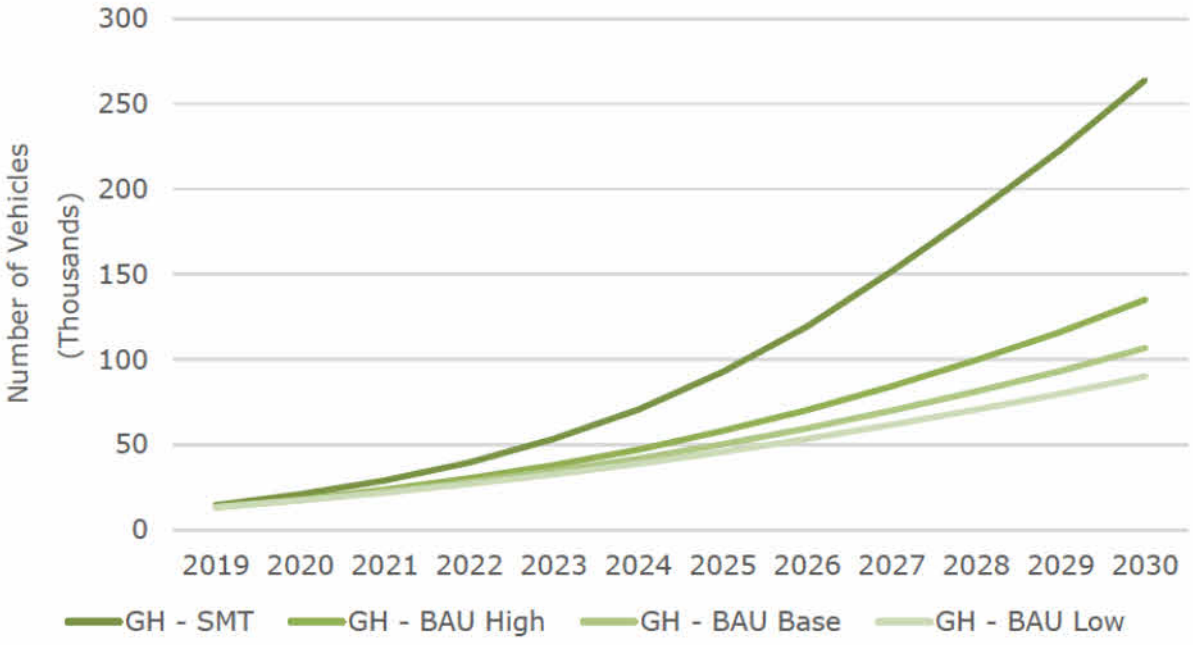


Figure 3: Light-Duty EV Adoption in APS Service Territory

Current EV Adoption	2030 GH SMT Forecast[4]	Progress Towards GH SMT Forecast	2030 Statewide TE Plan Target[5]	Progress Towards Statewide TE Plan Target
37,855	264,041	14.3%	450,000	8.4%

III. Public Charging Ports

There are 3,976 public charging ports in Arizona, with APS territory containing 17.7% of all Level 2 (L2) and 30.5% of all Direct Current Fast Charging (DCFC) ports in operation in Arizona as of December 31, 2022 (Plugshare, 2022). The following figures summarize the public charging port count for Arizona and APS's service territory (Figures 4 – 5)

Figure 4: Public Charging Port Count[6]

Port Type	Arizona	APS Territory
Level 2	3,069	543
DCFC	907	277

Figure 5: Public Charging Port to EV Ratio[7]

Port Type	Arizona	APS Territory
Level 2	1:27	1:70
DCFC	1:91	1:137

IV. APS Infrastructure Programs

1. Take Charge Arizona Pilot Program – Commercial Level 2

APS initiated the Take Charge AZ (TCAZ) pilot program in November 2018 to encourage EV adoption and learn more about driver charging habits by providing L2 charging stations in the Company's service territory. The program provides APS data about how different types of charging (workplace, fleet, multifamily, ect) interact with the grid. Through the program, APS installs, owns, and maintains the EV charging equipment for five years. After five years, customers have the option to keep the equipment or have it removed at no cost to the customer. By partnering with commercial and industrial customers, the program promotes daytime charging, helping shift EV charging load away from peak hours.

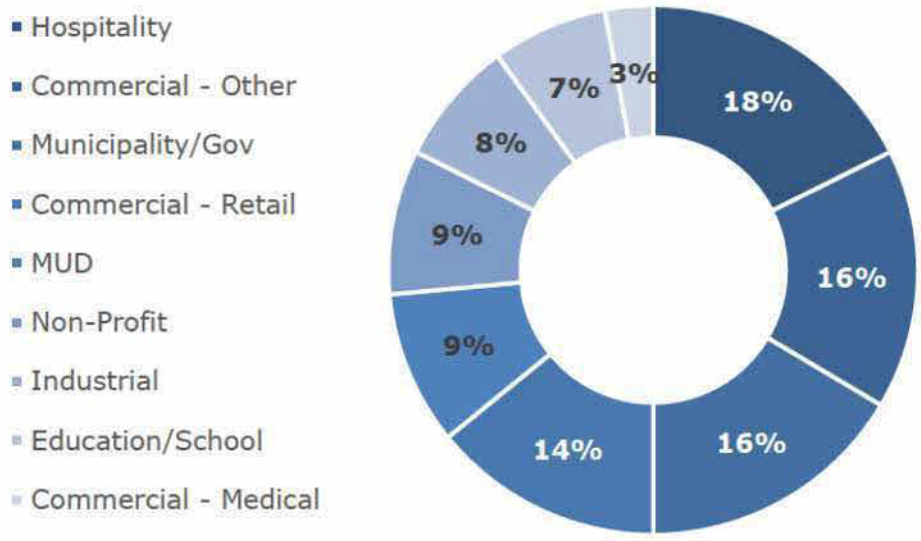
[4] Guidehouse (GH) Strong Market Transformation (SMT) Forecast, 2019. Developed for APS and used in APS's Resource Plan to forecast EV energy demand.
[5] Statewide TE Plan, 2019. Retrieved from https://docket.images.azcc.gov/E000012626.pdf?i=1642097136773.
[6] Public Charging Port Count retrieved from Plugshare as of the month of December, 2022.
[7] Ratio developed using current EV Adoption and Public Charging Port Count values for Arizona and APS Territory, rounded up to the nearest whole number.

During the reporting period, 258 L2 ports were energized, bringing the total ports energized to 672 as of December 31, 2022 (Figure 6). Of the ports energized in 2022, 41% of the ports energized are with the following customer classes: municipality or government, non-profit, multi-unit dwellings (MUDs), and educational institutions or schools (Figure 7). Also, 66% of ports installed are in low-income areas classified above the 50th percentile and 39% above the 70th percentile (Figure 8).[8] Lastly, L2 ports have been energized in 9 counties, 39% of which are outside of Maricopa County (Figure 9).

Figure 6: Ports Energized

During Reporting Period		Total	
Ports Energized	Customers Added to Waitlist	Ports Energized	Customers on Waitlist
258	104	672	142

Figure 7: Total Share of L2 Ports Energized by Customer Type



[8] Low Income (National Percentiles) are provided by the Environmental Protection Agency's Environmental Justice Screening and Mapping Tool and defined as the percent of individuals whose ratio of household income to poverty level in the past 12 months was less than 2 (as a fraction of individuals for home ratio was discovered). Retrieved from https://www.epa.gov/ejscreen/ejscreen-map-descriptions#category-demographics.

Figure 8: Total Share of L2 Ports Energized in Low Income Areas

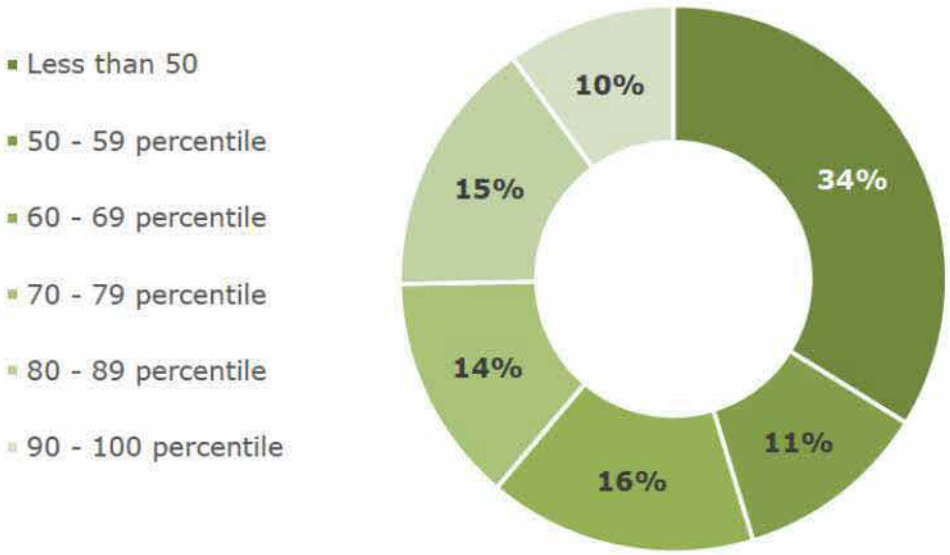
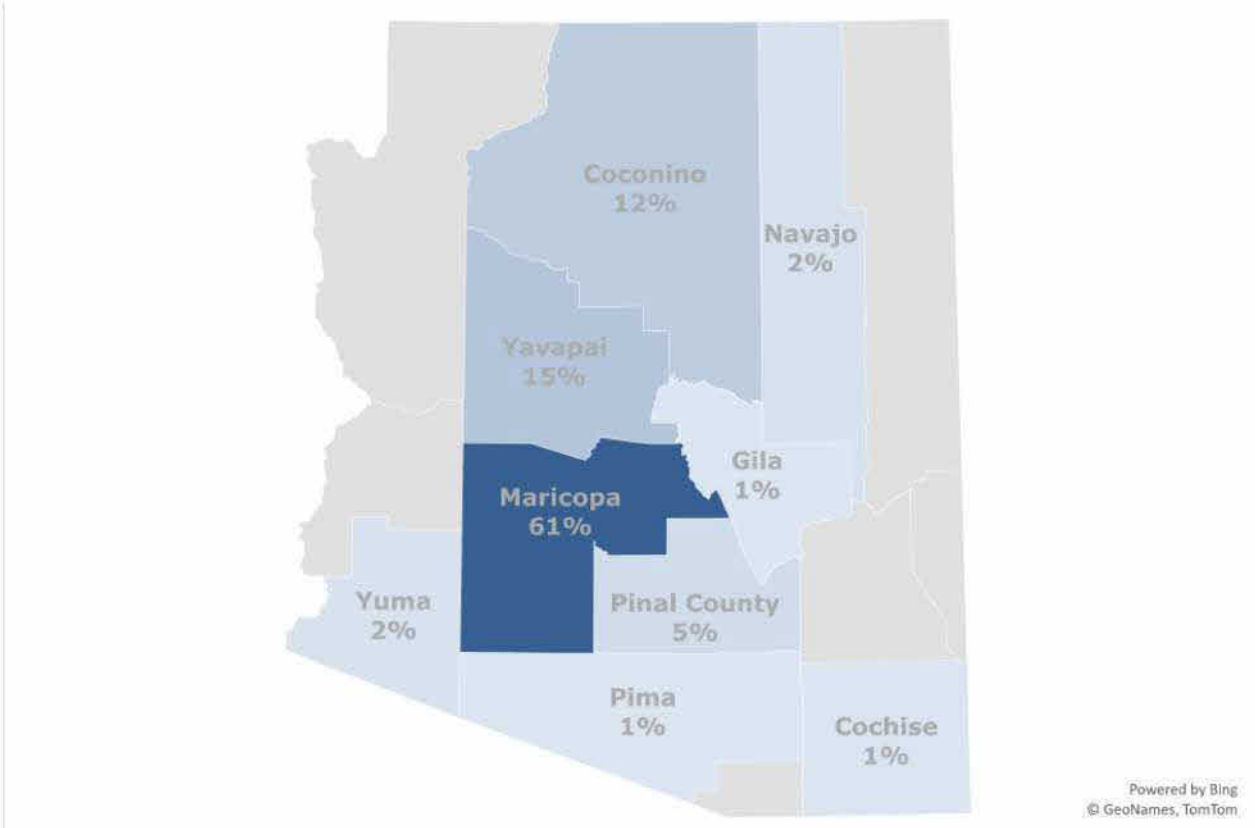


Figure 9: Total Share of L2 Ports Energized by County



2. Take Charge Arizona Pilot Program – Direct Current Fast Charging (DCFC)

APS partnered with Electrify America to deploy DCFC stations in strategic areas throughout the Company's service territory. During the reporting period, APS energized DCFC stations at five sites, which include the communities of Show Low, Globe, Payson, Prescott, and Sedona. Figure 10 depicts the DCFC charging site now open to EV drivers in Payson, Arizona.

Figure 10: DCFC site in Payson, AZ at Payson Rim Country Mall

Each location has one charging plaza with four individual DCFC stations. These stations are designed with future technology changes in mind to accommodate increases in EV battery charging capacity, using equipment that delivers DCFC rates ranging from 150 kW to 350 kW. These stations enable regional EV travel not previously served by the third-party EV charging market and provide APS valuable data in understanding how DCFC chargers contribute to peak demand.

V. APS EV Demand Side Management (DSM) Programs

The EV Managed Charging pilot program is intended to proactively address the growing electric demand from EV charging as EVs become more widely adopted. The pilot will target EV owners in the APS service territory, including residential customers with individual passenger vehicles, as well as commercial vehicle fleets, where applicable.

1. APS SmartCharge Program

The APS SmartCharge program launched on November 1, 2021 and encourages EV owners to share data on their driving and charging behavior by either installing a data-sharing module in the diagnostic port of their car or granting permission to share their car account data using

an application programming interface (API) with the implementer. SmartCharge participants receive a $25 sign up incentive and $5 per month incentive for providing ongoing data.

Based on the data collected during the reporting period, 78% of residential EV charging (kWh) occurs at Level 2 chargers, followed by DCFC and then Level 1 chargers (Figure 11). Additionally, most of the charging occurs post peak and in the morning hours, which made up 70% of charging energy (kWh) in 2022. This is followed by 22% of EV charging occurring midday during solar hours and 8% during peak hours from 4:00 – 7:00 p.m. (Figure 12).

Figure 11: Percent Home EV Charging (kWh) by Charge Level

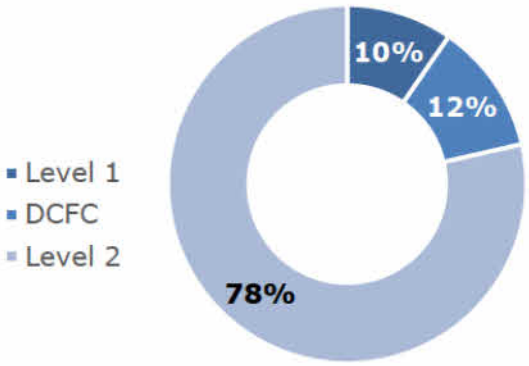
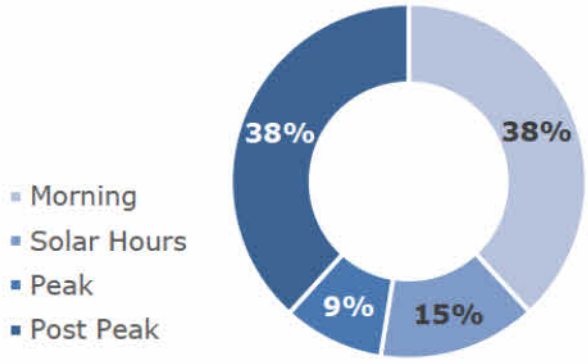


Figure 12: Percent Home EV Charging (kWh) by Time Period



The data and corresponding EV charging load shapes indicate that residential customers are very responsive to their home time-of-use (TOU) rate. In terms of home charging, which makes up 73% of all EV charging, most customers schedule their EV to charge off-peak. Home EV charging begins to increase after 7:00 p.m. and peaks at 10:00 p.m. (Figure 13). In terms of charging away from home, which makes up 27% of EV charging, a majority occurs midday and nearly equally split between DCFC and Level 2 (Figure 14). The charts below summarize the EV charging data from the APS Smartcharge program for all program participants (767 EVs as of December 31, 2022).

In 2022, the on-peak time window for APS's residential customer rates shifted from 3:00 – 8:00 p.m. to 4:00 – 7:00 p.m. APS transitioned customers to their new rates over the course of several months last year between the months of May through August. During this transition, APS continued to collect EV charging data from customers in the SmartCharge program. As a result, APS can compare the impact of a new on-peak charging window on customer EV charging behavior. Data shows that customers were responsive to the change and began charging during the 3:00 p.m. and 7:00 p.m. hours despite these hours formerly being considered on-peak. Figure 15 depicts this impact by illustrating the charging energy load shape for customers prior to and after the change to the on-peak time window. The data for TOU 3 – 8 is comprised of EV charging occurring January 1 – April 30, 2022, and the data for TOU 4 – 7 is comprised of EV charging occurring September 1 – December 31, 2022.

Figure 13: EV Charging by Time of Day - Home

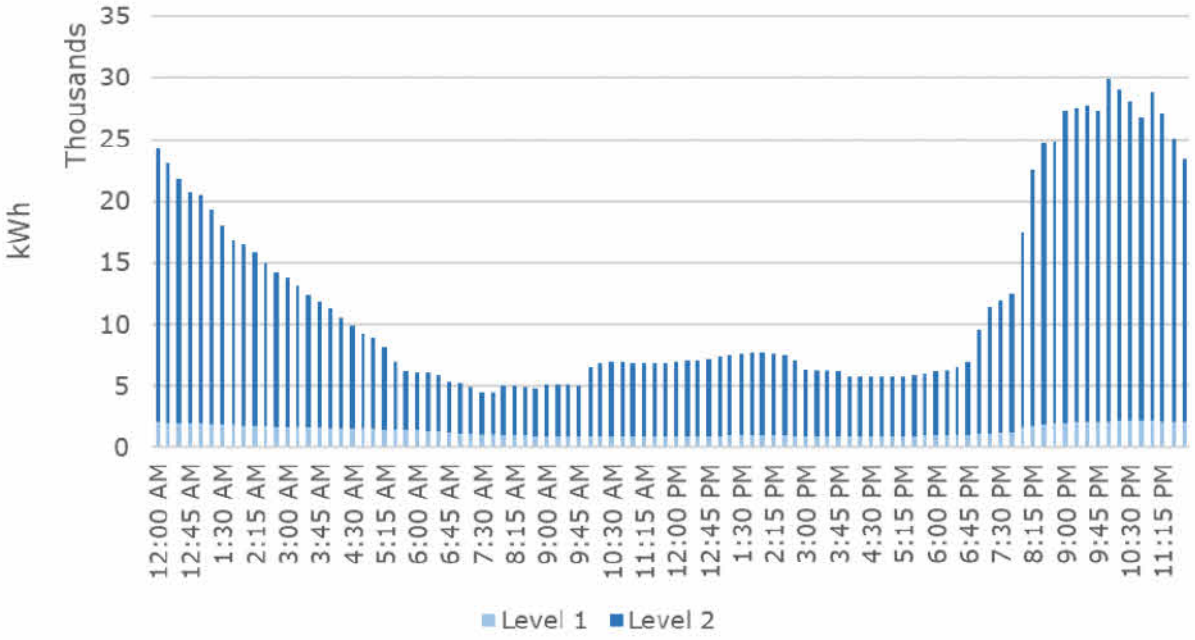


Figure 14: EV Charging by Time of Day - Away

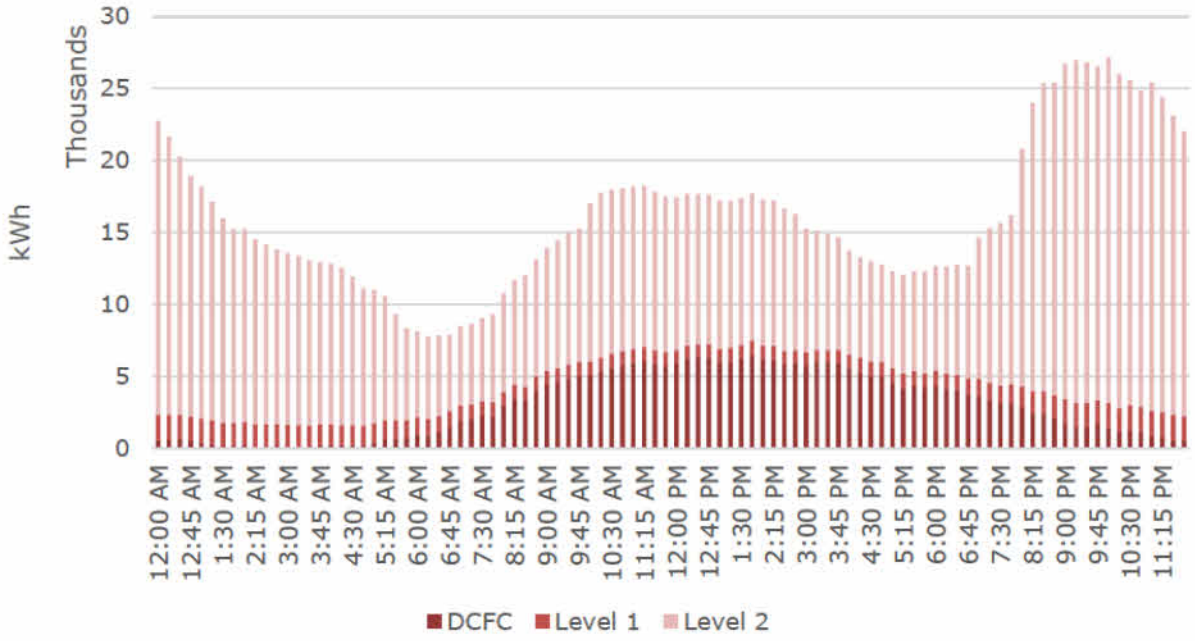
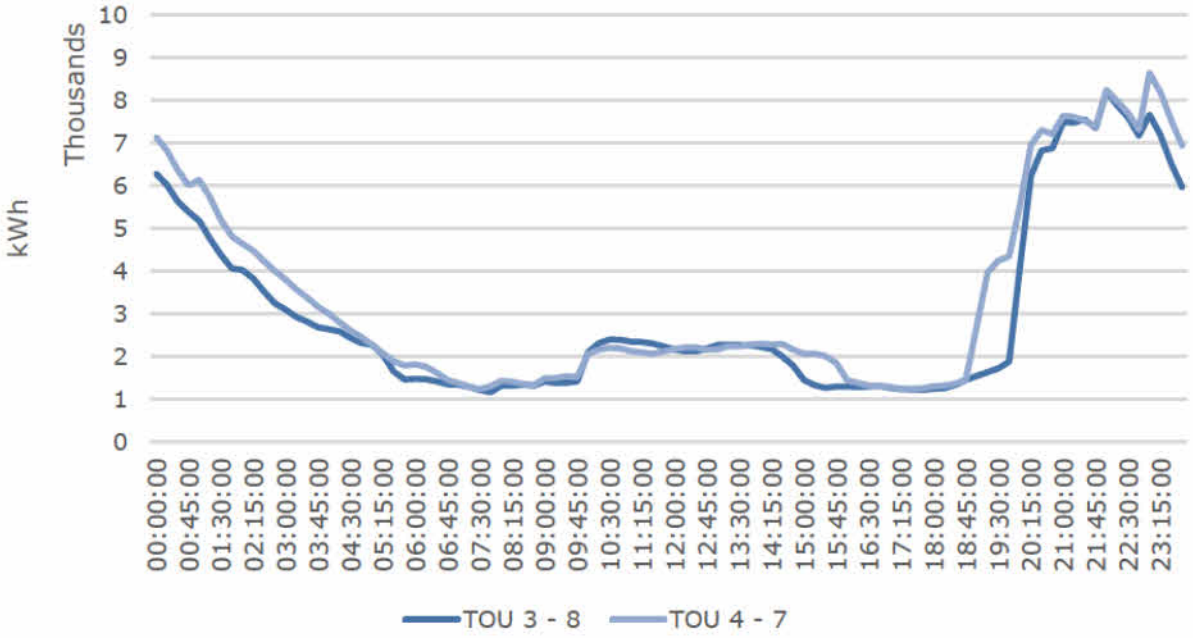


Figure 15: EV Charging by Time of Day – On-Peak Window Comparison



2. Residential Smart Charger Rebate

As part of the EV Managed Charging pilot program, APS offers a $250 rebate to customers that purchase a new connected smart charger (EV Smart Charger Rebate). Rebates for qualifying smart chargers can be claimed on the APS online Marketplace using an online rebate process. In total, 543 rebates were administered during the reporting period.

The pilot program provides customers an easy way to adapt their EV charging habits to their APS TOU rate by utilizing the added capabilities of a smart charger. Additional results of the EV Managed Charging pilot program can be found in APS's DSM Annual Progress Report filed on March 1, 2023, in Docket No. E-00000U-18-0055.

3. Chargeway

APS launched a partnership in 2021 with Chargeway, a company focused on EV charging education and outreach with dealerships and consumers. APS deployed six Chargeway Beacons at dealerships across APS's service territory. Chargeway Beacons are large touch-screen kiosks that serve as a tool for educating dealership sales staff and prospective EV buyers about EVs, available incentives, route planning, chargers, fuel savings, and utility programs. During the reporting period, the Chargeway Beacons experienced 71,348 interactions, averaging 32 interactions daily between January 1 – December 2022. In addition to the Beacons, Chargeway has a mobile app to help consumers navigate EV charging in a simplified way. During this reporting period, a total of 722 users downloaded the mobile app.

VI. Program Budget

For APS's infrastructure programs, the total spend during the reporting cycle was $11.8 million. Spend for TE programs through APS's DSM plan was $438,392. Additional details on budget and spend in APS's DSM plan were reporting in the Company's annual DSM report filed March 1, 2023 in docket E-00000U-18-0055.

VII. TE Collaborative Meetings

APS hosts TE Collaborative meetings with industry stakeholders a minimum of four times per year. APS hosted seven meetings with stakeholders since the TE Collaborative was created in late 2021, five of which were held during this reporting period. Summaries of each meeting are filed with the Commission shortly after they take place. The dates in 2022 that the TE Collaborative meetings were held are:

- March 4, 2022
- March 31, 2022
- May 26, 2022
- August 11, 2022
- November 3, 2022

The TE Collaborative meetings were attended by the following stakeholders:

- Alliance for Transportation Electrification
- AMPLY Power
- Arizona PIRG Education Fund
- ChargePoint
- Clean Air AZ (Valley of the Sun Clean Cities Coalition)
- City of Avondale
- City of Goodyear
- City of Phoenix
- City of Scottsdale
- Commission Staff
- Electrify America
- Energy Hub
- EVgo
- Flo
- FreeWire Technologies
- Hopi Tribe
- Lubin & Enoch
- Navajo Nation
- Nuvve
- RUCO
- SWEEP
- Tesla
- TEP
- Tierra Strategy
- WRA

VIII. Municipal Fleet Electrification

APS does not currently have access to the number of municipalities that are working to electrify their fleets; however, the Company is working with a few municipalities on these opportunities through its TE Collaboratives, including the City of Phoenix, City of Scottsdale, and City of Avondale, as well as separately with the City of Flagstaff. For example, the City of Flagstaff is working to implement their TE plans, and APS is supporting these initiatives by collaborating on EV charging equipment, charging schedules, and exploring creative solutions that optimize their electric fleets. APS will continue to partner with the municipalities and companies within its service territory to help interested parties meet their fleet electrification goals.

IX. Customer Experience

While most APS EV programs are in early stages of implementation, customer experience information was gathered from participants of the TCAZ program. The feedback helped garner an understanding of customer experiences and needs. In a survey conducted during the reporting period, nearly all TCAZ customers reported being satisfied or very satisfied with their overall TCAZ experience. In addition, nearly two thirds of all respondents indicated they view APS more favorably with respect to APS environmental responsibility because of the program. Survey results showed opportunities for improvement on educating users about off-peak charging benefits (just over 80% of TCAZ charger usage already occurs off-peak) and reducing program completion times. Lastly, over 90% of respondents indicated interest in other APS commercial programs. APS will perform customer experience surveys to evaluate its EV programs and will include results in future reports as the Company's EV programs mature.

X. Environmental

All the counties in Arizona except for Maricopa, Yuma, and part of Pinal County are in attainment for the Ozone standard. For more information, please see Environmental Protection Agency (EPA) website at: https://www3.epa.gov/airquality/greenbook/anayo_az.html.

XI. Customer Rate Plans

To date, APS does not have the ability to identify each customer in its territory with an EV in the home, aside from customers that have enrolled in EV specific programs, such as APS Smartcharge. Figure 16 summarizes the rates that customers with EVs are on that are enrolled in the APS Smartcharge program, including the percentage of all residential customers on each corresponding rate.

Figure 16: Customer Rate Plans

Rate	Number of SmartCharge Customers on Rate	Percentage of SmartCharge Customers on Rate	Percentage of All Residential Customers on Rate
Standard Energy Rates	87	13%	39.2%
Time-of-Use - Demand	330	49%	28.7%
Time-of-Use - Energy	257	38%	32.1%

In 2021, APS implemented a commercial DCFC Rate Rider, which is intended to foster increased market development of third-party owned public fast charging in APS's service territory. The DCFC Rate Rider reduces demand charges based on the load factor of public fast charging stations, which will phase out over time. During this reporting period, 28 customers were added and are taking advantage of the new rate rider.

XII. APS Transportation Fleet Electrification[9]

The APS fleet electrification goal is to transition 30% of all light-duty vehicles and equipment (including forklifts, UTVs/ATVs/Carts) to electric by 2025 with a stretch goal to be 100% carbon-free by 2050. The Company is also committed to transitioning medium- and heavy-duty vehicles and equipment once there are more commercially available options and upon retirement of current assets.

Figure 17: Current Status of Plug-in Hybrid, All-Electric Vehicles, and Equipment by Type

Equipment or Vehicle Type	Total Plug-in Hybrid/Electric	Percent Plug-in Hybrid/Electric
General Equipment[10]	90	26%
Light-Duty Vehicles	26	7%
Medium- and Heavy-Duty Vehicles[11]	0	0

Figure 18: Current Plug-in Hybrid and All-Electric Replacements Projected Within Next 6 Months

Equipment or Vehicle Type	Total Projected Plug-in Hybrid Replacements	Total Projected Electric Replacements
General Equipment	0	2
Light-Duty Vehicles	0	3
Medium- and Heavy-Duty Vehicles	0	0

Figure 19: Estimated Expenses for Plug-in Hybrid and All-Electric Replacements Projected Within the Next 6 Months

Equipment or Vehicle Type (Quantity)	Total Estimated Purchase Price	Total Estimated Annual Expenses	Expense Category
General Equipment (2 Forklifts)	$250,506	$10,000	95% Cap / 5% O&M
Light-Duty Vehicles (3 Trucks)	$175,680	$6,530	28% Cap / 72% O&M

Annual expense estimates include the cost of maintenance and electricity. Assumptions have been made based on industry research (*i.e.*, EPRI) and historical results for APS vehicles and equipment. Actual EV results may vary based on usage and variables not yet known. APS will

[9] The data provided for the status of the Company's fleet electrification is as of December 31, 2022 (Figure 17), with projections extending 6 months beyond that month to June 2023.
[10] Includes forklifts, ATVs/UTVs/Carts.
[11] Medium- and heavy-duty options not yet commercially available or currently price prohibitive. In lieu of viable hybrid/electric options, the company is leveraging jobsite idle-mitigation technology as a standard package for trouble trucks and has two Odyne bucket trucks with battery-assisted drivetrain and electric power takeoff (ePTO) systems.

continue to refine these assumptions as the Company progresses in its fleet electrification strategy.

Given the relative infancy of the APS fleet electrification strategy and the limited data around the true performance of EVs within the APS fleet, it is too soon to estimate what the net operating expense and rate base impacts will be. However, the company is committed to making prudent plug-in hybrid/EV replacement decisions at the end of each vehicle/equipment's natural lifecycle when affordable plug-in hybrid/EV options are available, viable and cost effective.